

Undergraduate Research and Community Outreach Newsletter

VOLUME 2, ISSUE 2

SPRING 2017

At the U,
we
transform
lives
through
teaching,
research,
and
service.

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Message from the Assistant Provost

To our readers,

This past spring semester was one of the busiest in the Office of Undergraduate Research and Community Outreach; from organizing UM's annual Research Creativity and Innovation Forum (RCIF) and the SMS Capstone Dinner, to preparing for the upcoming 2017 summer research program and the 2017-2018 HHMI Integrated Biology and Chemistry Authentic Research Laboratory Course Series.

Congratulations to our seniors who graduated, many of whom are matriculating into graduate programs. I also want to say congratulations to our students who were accepted into competitive summer research programs, and to the students who were recognized as winners at the annual RCIF. We are very proud of all of you.

This summer our office is looking forward to working with the 23 undergraduate students and 24 high school students who will be part of our 2017 summer research program, and hosting our annual Summer Research Symposium in July.

Our Science Made Sensible Program in which undergraduates mentored by graduate students are placed in middle schools and high schools as resident scientists is now in its 9th year. For the international component of the program four undergraduates will be going to South Africa this August to be resident scientists in 7th grade classrooms in Pretoria.

In closing, our office staff and I feel it is a real privilege to open the eyes of students to science who might otherwise never have looked.

Michael S. Gaines



Michael S. Gaines, Ph.D.
Assistant Provost of
Undergraduate Research
and Community Outreach
Professor of Biology

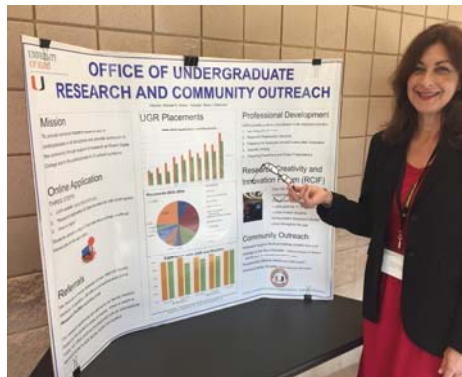
The Mission of the Office of Undergraduate Research and Community Outreach (UGR) is to provide mentored research experiences to undergraduates in all disciplines and provide outreach in the community through support of research at Miami Dade College and in Miami Dade County k-12 school systems.

THE UGR TEAM

The highly-skilled and responsive UGR team members work together to maintain the standard of excellence in the Office of Undergraduate Research and Community Outreach. We are dedicated to promoting diversity and integrity in research, and fostering partnerships between University of Miami and its surrounding community.



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Research, Creativity, And Innovation Forum 2017



On April 4th 2017, the Office of Undergraduate Research hosted University of Miami's annual Undergraduate Research, Creativity, and Innovation Form (RCIF) at the Shalala Student Center.

This year 113 undergraduate students across the University registered to present projects in either the Biological Sciences, Business, Engineering, Humanities, Physical Sciences, and Social Sciences. Students were judged by two faculty, post-doctoral fellows, and/or senior graduate students, and certificates were awarded to students whose scores earned them first, second, and third place in their respective categories.

The 2017 RCIF winners and their projects are listed on page 9 of this newsletter.

EDUCATION AND RESEARCH PROGRAMS

RAD

Reclaiming the American Dream (RAD) Scholarship Program, a \$10,000 annual scholarship funded by the National Science Foundation, supports UM transfer students from a community college who aspire to go into the STEM work force or pursue a graduate degree in a STEM field. Fifteen undergraduate students are currently in the RAD program.



Florida/Georgia Louis Stokes Alliance for Minority Participation (FGLSAMP) Program is a collaborative effort sustained by 14 colleges and universities throughout Florida and Georgia with a mission to significantly increase the number of underrepresented minority students who graduate with a degree in a STEM field. FGLSAMP currently supports 8 biomedical engineering students at UM.

IMSD

Funded by the National Institute of General Medical Sciences, the Initiative for Maximizing Student Development (IMSD) is a biomedical research intensive program for underrepresented students that want to earn a Ph.D. The goal of the initiative is to increase diversity in the biomedical research workforce. IMSD currently supports 13 undergraduate scholars and 6 graduate fellows.



Howard Hughes Medical Institute

The UM Howard Hughes Medical Institute (HHMI) Research Training Program exposes underrepresented minority students, who are majoring in a STEM field, to research and the joy of scientific discovery, with the ultimate goal of encouraging these students to enter research careers in the biomedical sciences. The HHMI program currently supports 27 undergraduates.

BRIDGE

The Bridge to the Baccalaureate Program is funded by the National Institute of General Medical Sciences. Bridge provides support for underrepresented minority Miami Dade College (MDC) students who wish to study and research in the field of biomedical sciences with the goal of earning a Ph.D. Students have the opportunity to take classes at MDC and UM that will prepare them for a career in research. Students also participate in research the summer after their freshman year. The Bridge program currently supports 19 MDC students.

RAD, FGLSAMP, HHMI, and IMSD program students are required to attend monthly professional development meetings planned by the program coordinators. Each of these sessions are structured around student development and preparation for graduate school. In Spring 2017 meetings have been dedicated to topics such as tips for improving scientific writing, and a special session on cultural awareness in STEM.

Science Made Sensible

The Science Made Sensible (SMS) Program is an initiative designed to establish a collaboration among University of Miami (UM) undergraduate and graduate students, Miami Dade College (MDC) undergraduate students, and Miami Dade County Public School (MDCPS) teachers and students. The goal is to promote a college-bound culture among traditionally underrepresented students, enhance the public school curriculum with innovative activities, enable UM students to translate their academic interests into practical classroom learning, and foster intellectual engagement among the youth of our community. SMS is funded by Wells Fargo.

12 undergraduate resident scientists were placed in six schools in the MDCPS system in the 2016-2017 academic year. Resident scientists each worked 70 hours per semester in their assigned classrooms. See pages 6 and 7 for more SMS related stories from this past semester.



Dr. Gillespie demonstrates the freezing properties of liquid nitrogen to the students from Booker T. Washington High School during a field trip to UM.

What Makes a Good Mentee: As Told By Dr. James Baker



Dr. Baker is a professor at UM in the biology department. He has been mentoring undergraduate students at UM for almost 10 years. He had his first undergraduate mentee when he was a graduate student over 20 years ago. Since then, he has worked with close to 100 students. Currently, Dr. Baker has 13 students in his lab, a “Baker’s Dozen”.

Q: Can you give a brief description of the research your lab does, and why is it important? How many students are currently in your lab?

In my lab we study the mechanisms underlying the activation of the respiratory system in a model insect, *Drosophila melanogaster*. Though these animals evolved a respiratory system independently from vertebrates they have a similar problem- their respiratory system develops as a fluid filled cavity that must be emptied of fluid before the animals become behaviorally active. In us this happens in the hours leading up to birth, culminating with the babies first breath. In insects, it happens just before hatching. Despite the evident differences between insects and vertebrates we believe that some of the same mechanisms may work to clear fluid in both cases- so understanding how this works in detail in insects could inform our understanding of how it works in us. Insects have one added novel and intriguing feature of this activation- some species initiate respiratory activation by producing a bubble of gas within their respiratory system- so we are also trying to figure out how they manage this trick.

Q: What are the differences, if any, do you notice between graduate student researchers and undergraduate student researchers?

The biggest differences between undergraduates and graduate students are experience/knowledge and time available to work. In my system, every student requires very individual instruction. For example, we do genetics in my lab but even students that have had genetics and genetics lab need to be taught *Drosophila* genetics. Also, undergraduates have many more specific demands on their time and so projects have to be structured around 1-5 hour blocks. Finally, I don’t expect undergraduates to understand the broad scope of the work going on in the lab. Similarly, they can’t be expected to participate at all of the levels of research that many think of as a prerequisite for paper authorship. In my lab, the expectation is that students will work to produce data figures, that they will attend lab meetings if possible and that they will participate in writing papers.

Q: What characteristics/qualities do you think makes a good mentee?

Curiosity, tenacity and precision. The best students I’ve had learn quickly to do what they need to do and they do it without tons of supervision. They are interested in the questions in the lab and driven by a desire to find the answers. All of that is for naught if they are too sloppy to keep track of their experiments and results.

Q: Do any memories/ brief stories of your previous mentees stand out to you that demonstrate one (or more than one) of the previous characteristics, you just mentioned?

Over and over again I see students get hooked on the research and they are very sad to have to leave when they graduate. Some volunteer their time over summers and work long hours without pay just to get the answers they seek. One student helped film, write and publish a video article because he was so passionate about the work.

Q: What would you say to a prospective or incoming student who is intrigued by research?

You should do research, but be careful. Think about why gambling is addictive- when you gamble you place a bet (make a prediction) and then win or lose (observe the result). Research is the same- you make an hypothesis and then do an experiment to observe the results. In both gambling and research positive results make the winner very happy. So, for some, research is addictive. But you should still do it! Because it’s only in the process of engaging in scientific research that you begin to really understand science. In my lab students engage in physiology, genetics, cell biology, molecular biology and developmental biology- It’s all one thing. That kind of intellectual integration is extremely valuable and rewarding and will make it easier to understand all science.

Arboretum Plants Teach Students About Hidden Microbial Players Through Hands-On Science

Written by Kasey Kiesewetter

Published with permission from Dr. Michelle Afkhami and Kasey Kiesewetter

This spring, students in Dr. Michelle Afkhami and Dr. Valentine St. Hilaire's Howard Hughes Medical Institute labs designed research projects looking at the effects of fungal endophytes living inside the leaves of Gifford Arboretum trees. Fungal endophytes are fungi that live in all plants and that can have important ecological, medical, and economic attributes. For example, endophytes can increase drought tolerance and reduce pest damage of plants through chemical defenses. They are also the source of important natural products such as Taxol, which is a commonly-used anti-cancer drug.

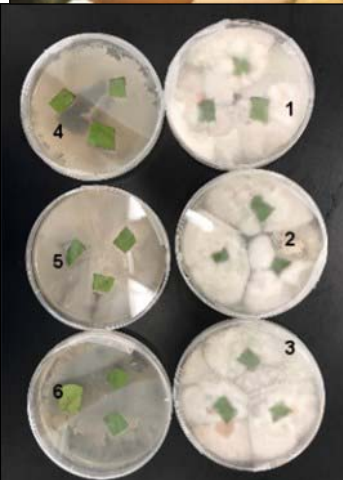


Above: Students collecting plant tissue in the Arboretum.

Students in the class are performing two experiments, one on biological properties of fungal endophytes and then another on chemical properties. To perform the experiments, students first spent time getting familiar with the Arboretum's collection and sampling tree leaves. Next, the students sterilized and cultured fungi from the leaves while observing how the fungal endophytes' growth changed under a variety of conditions.

One popular topic that excited students was looking at the antibacterial properties of both medicinal and edible plants. Other groups explored the fungal endophyte differences in angiosperms compared to gymnosperms; in leaves from differing heights on trees; and from tropical plants in high versus low temperature conditions. Still other groups investigated coexistence between fungal endophytes of different species under temperature stress or in the presence of bacteria.

Since completing the biological proportion of the class, the students have begun to use their cultures to explore differences in chemical properties of these fungal endophytes.



Top: Sterilizing and culturing fungal endophytes from plant tissues

Bottom: Fungal endophytes of miracle fruits grown either without bacteria (1-3) or without (4-6)



Above: Fungal endophytes from a cactus (CAC) and angel's trumpet (AT) competing against each other. Plates on the left were at room temperature and plates on the right were in a hot room

About the Author



Kasey Kiesewetter is a doctoral student originally from Hunterdon County, NJ in the Department of Biology at the University of Miami. She is currently researching the effects of habitat fragmentation in the Pine Rocklands under the guidance of Dr. Michelle Afkhami.

SMS Closes 2016-2017 Academic Year With Essay Contest and Capstone Lunch



Above from left to right: Dr. Gillespie, Jorge Villacampa, Dr. Gaines, and Patrick Morris at the SMS Capstone dinner. Jorge and Patrick attended as representatives of Wells Fargo, which funds the program.

The Science Made Sensible (SMS) program hosted an essay contest for Miami Dade County Public School (MDCPS) students who participated in the SMS program this past academic year. Middle school students were asked to answer the question “how has the resident scientist working with your teacher, made science more sensible to you”. High school students were asked “how has the resident scientist working with your teacher, helped you prepare for college”.

On Saturday April 29th the SMS program hosted a capstone lunch to wrap-up this academic year’s activities for MDCPS teachers and University of Miami (UM) graduate students and undergraduate students, who participated in the program. Representatives from Wells Fargo, which provides funding for SMS, were also in attendance. Talks about SMS were given by Dr. Michael Gaines, the SMS Program Director; Dr. Leonidas Bachas, the Dean of UM’s College of Arts and Sciences; Gladys Barrio, the MDCPS Instructions Supervisor for High School Science; and Jorge Villacampa, Wells Fargo’s Area President, Community Bank. Before the conclusion of the dinner, the six essay contest winners (one from each of the participating schools), were recognized and each received an Amazon Fire tablet. Below are the list of winners and their respective schools.

Charvis Richards, Georgia Jones-Ayers Middle School

Bryan Ayuso, Jose de Diego Middle School

Joan Perdomo, Richmond Heights Middle School

Maria Cuellar, Booker T. Washington Senior High School

Tiara Taylor, Miami Jackson Senior High School

Laura Lugo, Miami Southridge Senior High School



Above: Dr. Gaines presents essay contest winner, Maria Cuellar with a tablet at the SMS Capstone Dinner.

Upcoming Events

University of Miami Summer
Research Symposium on
July 27, 2017 in
Cox Science Center



Above SMS program participants from Jose de Diego Middle School at the SMS Capstone Dinner from left to right: Jessica Valido, Ana Cadreche, Nicole Kloosterman, Dana Seymour, and Sarah Cowles.

SMS Program From Resident Scientist

Rochelle Prokupets's Viewpoint

"I had a few science teachers in high school that stimulated by interest in science, especially in chemistry. The SMS program focuses on hands-on activities, demonstrations, and experiments to make science both more understandable and exciting. Since high school was the time when my interest in science began, I hoped to also introduce my students in the SMS program to the wonders of science, to show them the applicability of the concepts learned in class to daily life, and to create experiments that would be fun and would highlight the concepts learned in class.

I constantly was talking to my students about college and the importance of higher education. Along with this, I reinforced the idea that the chemistry class they were in was useful. In two experiments, students were able to take home their products- soap and a silver mirror. For those students who stressed that they will not be studying science after high school, I emphasized that the chemistry class still gave them practice in working hard and thinking critically- skills that are useful in any field.

The challenge I faced most was working around testing dates, which were fairly frequent. In order to plan around testing, Mr. Bidokwu and I had to communicate well. Sometimes, last minute changes had to be made.

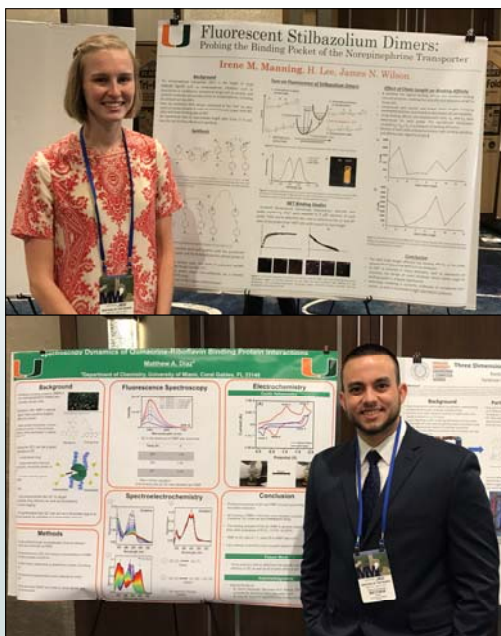
I have gained a greater understanding and appreciation for the work that teachers do. I have grown in my ability to present and explain ideas, and I have seen the importance of coming in to the school consistently in order to forge stronger relationships with the students. I noticed that, unfortunately, many students are unaware of local educational opportunities available to them. After working with a few students individually on applications to summer programs, I have learned that by simply relaying opportunities to my students, I can help provide a pathway to further their education in the sciences and support a classroom atmosphere that promotes higher education.

The SMS program is a wonderful opportunity for the SMS resident as well as the public school students. It is important to put full effort into your work at the school—it truly does make a large impact."



Rochelle Prokupets was a SMS resident scientist at Booker T. Washington High School during the 2016-2017 academic year. Rochelle is a rising senior at the University of Miami, majoring in chemistry with minors in biology and math. She is from Sarasota, FL and after graduation she plans to go to medical school. Outside of the classroom, Rochelle enjoys traveling, cooking, and doing jigsaw puzzles.

ACC Meeting of the Minds 2017



In April, six University of Miami (UM) students traveled with Dr. Michael Gaines to Duke University to present their projects at the annual Atlantic Coastal Conference's (ACC) Meeting of the Minds. Topics of projects were from different disciplines such as Film and Religious studies to Biomedical Engineering.

Juniors Irene Manning (top photo) and Matthew Diaz (bottom photo) were two students whose abstracts impressed UM's selection committee. Irene presented her project "Fluorescent Stilbazolium Dimers: Probing the Binding Pocket of the Norepinephrine Transporter", and Matthew presented his project "Spectroscopy Dynamics of Quinacrine-Riboflavin Binding Protein Interactions" at the ACC Meeting of the Minds 2017.

Interview With Future Professor Jessica Cothorn

Q: What are your current plans for after graduation?

In the fall, I am going to start a PhD program in biology at University of Oregon. I was admitted to the program through the Institute of Ecology and Evolution. They have also awarded me the Promising Scholar Award.

As soon as I got to the campus for my interview, I knew that I had to go there. The program and the university had everything I was looking for and more. I was so enthusiastic about everything during my interview, that they asked me later if I'd like to help them with recruitment.

Q: What does your ideal future career/life look like?

My goal is to become a professor. I want to study how anthropogenic environmental changes affect microbe communities. I hope to do this at a university in the Pacific Northwest or in New Mexico.

Q: What was your research project about and why is it important?

I started in the Skromne Lab during my second semester. It is a neurodevelopmental lab. After about two years in the Skromne Lab, I joined the Searcy Lab which is an ecology lab.

In the Skromne Lab, I studied the role of retinoic acid receptors (RARs) in hindbrain development of zebrafish. Zebrafish have four types of RARs, which are very similar to the three RARs that humans have, but no one has previously studied the role of each individual receptor in hindbrain development. It is important to understand how the hindbrain develops because doing so may help us learn how to prevent Chiari malformations.

In the Searcy Lab I assisted Caitlin Mothes, a graduate student, with one of her projects. Our goal was to create a niche model for lizards invasive to south Florida. This model would help us predict how climate change will affect the range of these lizards.

Q: How has being an HHMI student impacted your undergraduate experience?

Through the HHMI program, I learned what a PhD was and how to find and apply to PhD programs. It also made it possible for me to have fantastic research experiences. I joined the HHMI program as a way for me to find out if I really wanted to pursue science. If I hadn't, I probably would not have realized how much I love research.

Q: Anything unique/interesting you learned from being in the program?

While I was in the program, I was in a few classes where we discussed some thought-provoking books. One of those books was about Henrietta Lacks. For me, her story really drove home the message that scientists have a responsibility to think about the morality of their work and the impact that they have on society. That lesson made me see research from a different perspective.

Q: What would you say to a prospective or incoming student who is intrigued by research?

The most important piece of advice I have is to find a good work-life balance. It took me a while to figure that out for myself, but once I did, my classes became easier and I enjoyed my hobbies more.

You should also try to stay open to new opportunities. One of my friends started out wanting to be a psychiatrist, but now she's studying business. My brother was going to be a history professor, but now he's in law school. I wanted to be a neurosurgeon, but now I'm going to study ecology. We were all initially hesitant to change our plans, but we're all glad we did.



Jessica Cothorn, pictured above in the middle with her siblings, is originally from Las Cruces, New Mexico. She graduated this spring with a Bachelor of Science in biology, and had consistently made either the Dean's list or the Provost's Honor Roll throughout her undergraduate career. She was also the recipient of the One Blood Scholarship, the Lois Pope Neuroscience Summer Research Scholarship, the Coca Cola Scholarship, Citizen Potawatomi Nation Tribal Scholarship, and the President's Scholarship. Jessica has presented her research at SACNAS 2016 in California and at University of Miami's RCIF. Outside of science, Jessica enjoys learning about art and she sometimes applies that knowledge to her own drawings and paintings. She also enjoys biking and kayaking in some of the state parks in South Florida.

We enjoyed having Jessica as member of the HHMI Research Training Program. We are extremely proud of her for getting accepted into University of Oregon's PhD in biology program. Her good nature and quiet intellect will be missed. We wish Jessica good luck on all her future endeavors. We know she will continue to be a success.

Congratulations RCIF Winners 2017

Sidney Lane *First Place Biological Sciences*

"Using Fluidigm BioMark HD System to analyze gene expression in CD8 T cells from HIV-infected patients"

Divya Sha *First Place Engineering*

"Design and evaluation of fibrin gels for the controlled local delivery of regulatory proteins"

Nidhi Patel (pictured right) *First Place Humanities*

"Project JumpStart: Influencing Microsystem Processes in Narmada Rehabilitation Primary Schools"

Irene Manning *First Place Physical Sciences*

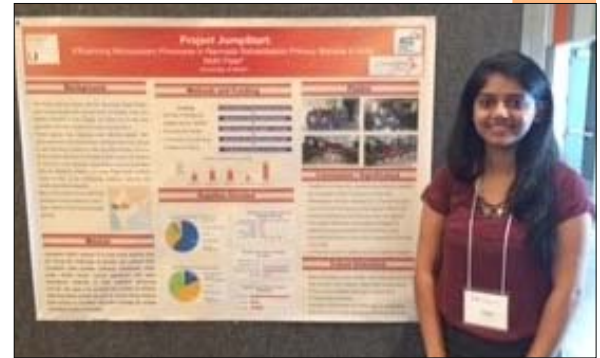
"Probing the Binding Pockets of the Norepinephrine Transporter via Fluorescent Stilbazolium Dimers"

Kyla Leonard, Daniel Urkov, Roberto Lazo, Sarah Maylott *First Place Social Sciences*

"Handling Newborn Monkeys Alters Exploratory Behaviors"

Jacob Beck *First Place Business*

"Using Economic Methodology to Drive Honey Bee Colony Loss Policy"



Sachi Desse *Second Place Biological Sciences*

"Interactions between Stress-Induced Inflammation, Glycogen Synthase Kinase-3 (GSK3) and Depression"

Connor Verheyen *Second Place Engineering*

"Rheological Analysis of PEG-Reinforced Alginate Hydrogels for Mechanically Stable Cell Encapsulation"

Meghana Shownkeen *Second Place Humanities*

"The Philosophy of Social Media: The Anti-Intellectualization of Fun"

Kathryn Cioffi *Second Place Humanities*

"Development of a Multi-Component Justice Measure"

Alexander Berne *Second Place Physical Sciences*

"Mapping the Behavioral Profile of Drosophila Larvae in Response to Controlled Mechanical Stimuli"

Kyle Oshiro *Second Place Social Sciences*

"ESPN's evolving framing of collegiate sports wagering during NCAA football programming: an analysis of College GameDay"

Christopher Albright *Second Place Social Sciences*

"Psychosocial Factors Associated with Sexual Transmission Risk Behavior and Medication Adherence in Men Who Have Sex with Men Living with HIV/AIDS"

Kathryn Meyers, Olivia Watson, Joachim Lopez *Second Place Business*

"Ad Story: A Machine Learning Algorithm for Designing Advertising Stories"

Kieren Mukerjee *Second Place Business*

"The Right to Stream Alone: The Video Privacy Protection Act Today"

Lee Kissel *Third Place Biological Sciences*

"Anti-Inflammatory Mechanisms of Photoreceptor Survival During Neurodegeneration"

Joseph Reda *Third Place Engineering*

"Novel Nanotechnology Strategies to Enhance Oxygen Diffusivity in Encapsulated Pancreatic Islet Grafts for Type 1 Diabetes"

Farrah Mohammed *Third Place Engineering*

"Acute Response of Neural Tissue due to Microelectrode Insertion and the role of Deferoxamine"

Jiajun Huang *Third Place Humanities*

"Two Responses to Okin's Objections to Nozick's Entitlement Theory"

Yujia Zhou *Third Place Physical Sciences*

"Carbohydrate Recognition in Water by a Conformationally Dynamic Synthetic Receptor"

Ariel Paz *Third Place Social Sciences*

"Investigating the Impact of Two Cognitive Training Smartphone Applications on Working Memory Performance"

Shivani Hanchate *Third Place Social Sciences*

"The Correspondence Between Negativity Bias and Working Memory with Emotional Distraction"

Jessica Garcia *Third Place Social Sciences*

"Identification of Preschool Children's Behavior Problems Using Teacher Reports Compared to the ASPI"

Jason Pymonto *Third Place Business*

"Parenting and Attachment as an Indicator of Millennial Leadership/Management Preference"

Nicola Pereira *Third Place Business*

"The Efficacy of Behavioral Interventions in Improving HIV Antiretroviral Therapy Adherence"

Message From The Editor

To our graduated seniors,

We will miss you and we wish you success in all that you strive to accomplish. It is great to be a Miami Hurricane because of the people, yourselves included, who have given the U that reputation.

To our current students,

Thank you for an awesome year. Have a safe summer and see you in the Fall.

I would like to say thank you to everyone who provided pictures, information, interviews, and photo permission. Your assistance is greatly appreciated.

Angela Astorini

UGR Program Coordinator and Editor

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